A Proposal To Sample Buildings for the Presence of World Trade Center Dust

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For the September 13, 2004, Meeting of the
World Trade Center Expert Technical Review Panel

Background

- This presentation will review the latest proposal for sampling to determine the extent of WTC impacts posted on the panel's web site on September 1

- This is a revision of the proposal presented to the panel during the last meeting on July 26, 2004 and is based on discussions and efforts to address issues raised.

- This presentation will emphasize changes made from the last proposal.

Objectives

To determine the geographic extent of WTC dust residues in residential and non-residential buildings. Results will be related to cleaning history of the buildings to the extent possible.

To validate a method to identify a WTC signature in sampled dust

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Approach For Sampling

<u>Initial proposal</u> discussed sampling in terms of a grid superimposed on lower Manhattan. Buildings were to be sampled based on their proximity to nodes on the grid selected at random. Example provided showed a grid comprised of concentric circles and radials extending from Ground Zero, with nodes defined by intersection of radials and circles.

<u>Revised proposal</u> is based on a "spatially balanced" probability survey design. This approach insures equitable spatial coverage of the buildings while maintaining the objectivity in building selection inherent in probabilistic survey designs.

4

Spatially Balanced Sampling

- Developed to select probability samples of environmental populations.

- Samples that are approximately evenly dispersed over the area to be sampled are generally statistically more efficient than simple random samples.

- The technique is very general and can be applied to a wide range of populations that can be defined in terms of two dimensional coordinates.

- Stevens, D. L., Jr. and A. R. Olsen (2004). "Spatially-balanced sampling of natural resources." J. of American Statistical Association 99(465): 262-278.

Spatially Balanced Sampling Can Incorporate Other Factors

- Stratify by concentric circles centered on World Trade Center

- Stratify by building type, e.g., residential and non-residential

- Stratify by HVAC status

- Stratify by EPIC contamination areas

- Spatial balance is maintained within strata
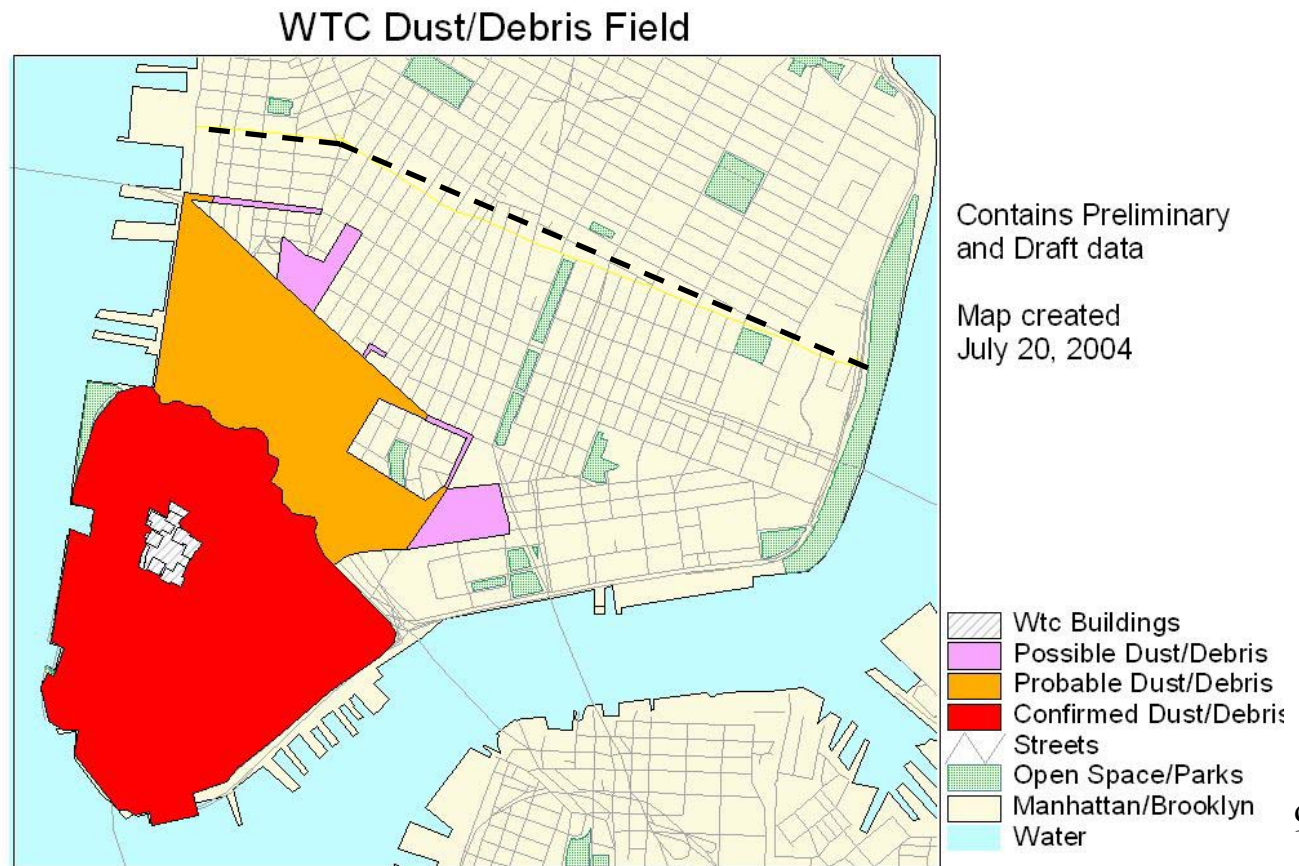
6

Spatially Balanced Sampling

An example of a spatially balanced sample of buildings in lower Manhattan is shown in the next slide. The population was stratified into 4 categories of distance from the WTC site and a sample with an expected number of 5 buildings from each category was selected. This sample achieves an approximate "concentric circle" design about the WTC site allowing for the constraints of the shape of lower Manhattan and the location of the population units.

Example of a Spatially Balanced Sample Stratified by Distance from Ground Zero
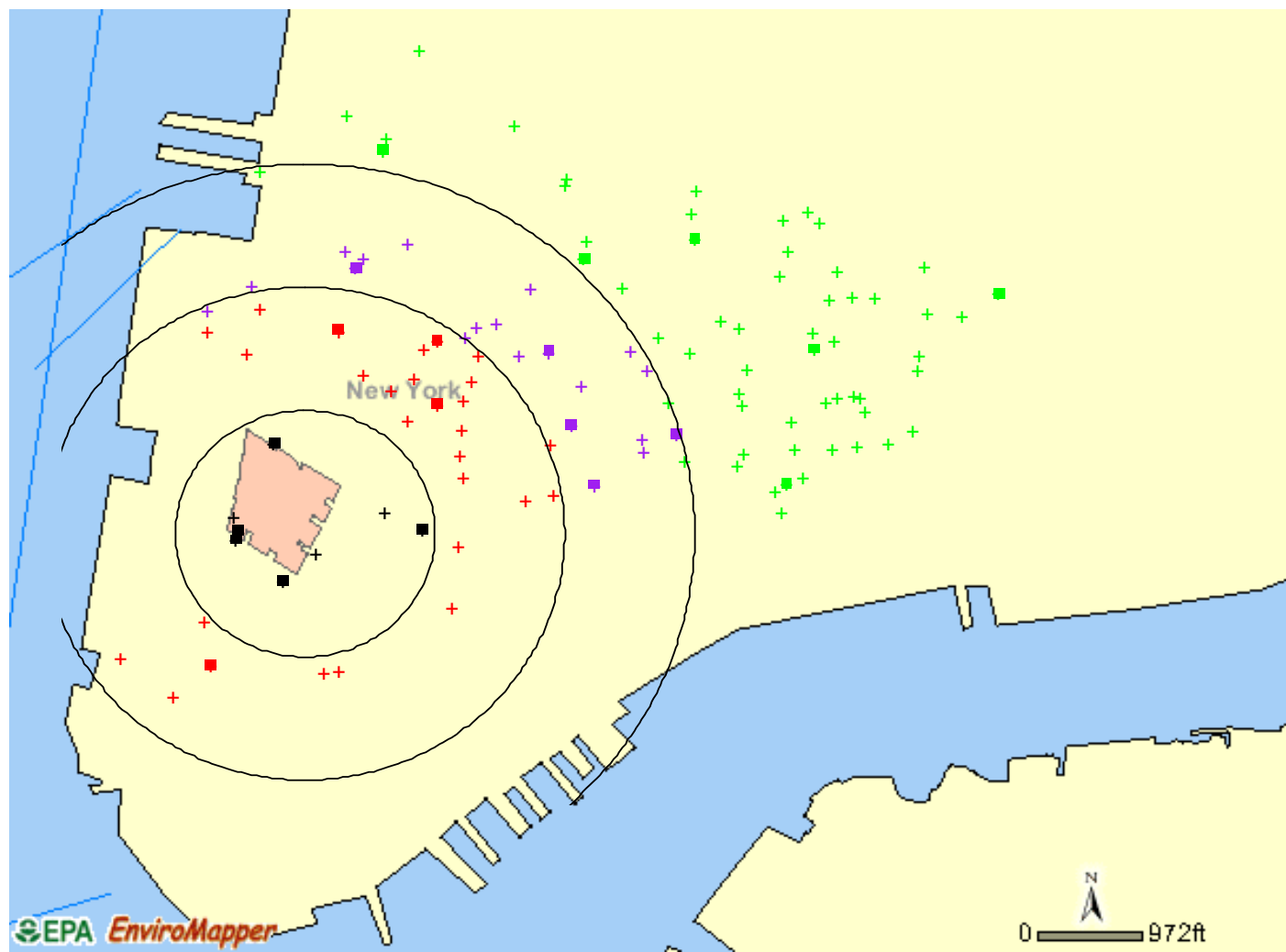
Settled Dust/Debris Areas

EPIC (Environmental Photographic Interpretation Center) analysis
identified known (red), probable (orange), and possible
(purple) areas of deposition of WTC dust and debris.

WTC Dust/Debris Field

Contains Preliminary
and Draft data

Map created
July 20, 2004

Wtc Buildings
Possible Dust/Debris
Probable Dust/Debris
Confirmed Dust/Debris
Streets
Open Space/Parks
Manhattan/Brooklyn
Water

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Overall Approach for Building Selection

1) Develop list of public and private buildings that are eligible for selection.

2) Develop stratification variables which become identifying characteristics of buildings in population. Examples:

    -- distance from Ground Zero

    -- EPIC identified areas

    -- building type

3) Employ spatially balanced sampling software to make selection of buildings within strata.

Building, Unit, and HVAC Characterization

-- Sample 1 "unit" per 2 floors, facing Ground Zero.

-- 3 or more modified aggressive air samples per unit

-- wipe samples plus microvac samples

-- for HVAC characterization, sample outlet, filter, mixing plenum, and inlet to indoor sampled area.

Contaminants

COPC	Indoor Air Benchmark	Settled Dust Benchmark
Asbestos	0.0009 S/cc	TBD*
MMVF	0.01 S/cc	n/a**
PAH	0.2 $\mu g/m^3$	150 $\mu g/m^2$
Silica	5 $\mu g/m^3$	n/a**

* To be determined. Candidate is 5000 S/m^2 which is background value used in Libby, Montana.

** Not available. Health-based benchmarks not available.

Data Analysis

Results will be presented in terms of the number, proportion and location of buildings where measurements exceed health benchmarks and presence of WTC signature dust is indicated.

Results will be categorized by distance from the WTC site.

Cleaning history of building and impact of HVAC will be evaluated as data allow.

Interpretation of results will include consideration of measurements obtained at non-WTC impacted sites in New York City.

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WTC Signature Study

Describe "signature" for WTC dust and refine analytical methods for identification.

Retrieve archived dust samples, archived air filters from air sampling of impacted buildings, and current sampling such as Deutsche Bank, to confirm presence of signature in indoor environments.

Retrieve archived dust samples or air filters from background studies, and take current background samples, to confirm signature is not in unimpacted locations.

14